REMARKS

Claims 1-25 were previously pending in this application.

Claims 1-25 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-25 stand rejected under 35 U.S.C. 102 (b) as being fully anticipated by any one of Kilby et al, Bentler, Sato et al, Cooke or any commercially available double sided board with or without sockets for accepting components.

Claims 1, 10, 15, and 22 are amended.

New claims 26-29 are added.

No new matter is added.

With entry of this amendment, claims 1-29 remain in the case for reconsideration.

Reconsideration is respectfully requested.

Claim Rejections – 35 USC §112

Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The rejection of claims 1-25 under 35 U.S.C. 112, second paragraph, is respectfully traversed.

The Examiner states that it is not clear what is meant by "[front] side" and "back side" of a printed circuit board. The Examiner further alleges that "it is not clear how front and back sides would be determined for boards with components mounted on both sides....Front side and back side seems to be meaningless for such boards."

It is, however, stated at page 3, lines 26-28 of the present application that:

"Most circuit boards have a front or component side, on which all or most of the components are mounted, and a rear or back side, which typically has few, if any, components."

Thus, one skilled in the art would understand what is mean by the front and back sides. For these reasons, the applicants respectfully request the withdrawal of this rejection.

Claim Rejections – 35 USC §102(b)

Claims 1-25 are rejected under 35 U.S.C. 102 (b) as being fully anticipated by any one of Kilby et al, Bentler, Sato et al, Cooke or any commercially available double sided board with or without sockets for accepting components.

The rejection is respectfully traversed.

Although the applicants do not agree with the analysis, to facilitate the allowance of this case, claim 1 is amended to recite:

"A system for testing a semiconductor device comprising:

a circuit board comprising circuitry adapted to provide an actual operating environment for the semiconductor device, the circuit board having a front side and a back side;

test terminals formed on the back side of the circuit board and arranged to couple the semiconductor device to the circuit board, and

automatic handling equipment arranged to allow automatic coupling and decoupling of the semiconductor device to the test terminals."

None of the cited references teaches or discloses the test system, as recited in claim 1. In particular, no such test system is shown in the cited references suitable for testing a semiconductor device with automatic handling equipment arranged to allow automatic coupling and decoupling of the semiconductor device to the test terminals, as recited in claim 1.

For example, Beutler, merely teaches a miniature shield with opposing cantilever spring finger, i.e. removable electromagnetic shielding. Because the circuit board 25 is placed within housing 201, such arrangement of the claimed invention is not possible. See col. 2, line 49 of the Beutler reference.

Sato et al. merely teaches a high-density circuit module, where a space for receiving components is formed between the circuit board and the shield plate, so that both sides of the circuit board can be used for mounting the circuit components. In Sato et al., because the circuit board 3 having components 5 are disposed within a shield case 1 and shield plate 2, the above arrangement of the claimed invention is not possible. See col. 3, lines 47-56.

As for the Kilby reference, it merely teaches a single-sided or a double-sided circuit board provided with mounted semiconductor devices. With the circuit board of the Kilby, the metal conductors on the circuit board are interconnected by wires embedded in the board itself, thereby dispensing with the need for a multilayered circuit board. It teaches or

discloses nothing about the testing of the semiconductor devices or the arrangement as recited in claim 1.

In addition, Cooke is directed to a method of manufacturing a circuit assembly and has nothing to do with testing of semiconductor devices or the arrangement as recited in the claimed invention.

For the reasons discussed above, none of the cited references, either alone or in combination, teaches all of the elements of claim 1 and, therefore, does not anticipate claim 1, as amended hereby. Furthermore, claim 15, which recites the same limitations, is allowable for the reasons discussed above.

With respect to claim 22, none of the cited references teaches or suggests:

> "coupling the semiconductor device to the back side of a circuit board comprising circuitry adapted to provide an actual operating environment for the semiconductor device using the automatic handling equipment;
>
> operating the circuitry on the circuit board; and
>
> decoupling the semiconductor from the back side of a circuit board using the automatic handling equipment," as recited in claim 22.

Also, claims 2-14, which depend from claim 1, or claims 16-21, which depend from claim 15, or claims 23-25, which depend from claim 22, recite additional features that are not taught or disclosed in the cited references. Therefore, they are independently allowable. For example, none of the cited references teaches or discloses an interface board coupled to the test terminals, or the interface board adapted to reverse the arrangement of the test terminals, or the interface board is adapted to create a test environment that is the same as actual operating conditions for the semiconductor device, or the interface board adapted to compensate for environmental differences caused the socket. This is especially true, because there is no need for such an interface board in the prior art disclosed in the cited references because none of the cited references is directed to the testing of the devices as recited in the claimed invention.

For the reasons discussed above, new claims 26-29 are also allowable.

For the foregoing reasons, reconsideration and allowance of claims 1-26 of the application as amended is solicited. The Examiner is encouraged to telephone the

undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

At page 2, line 8 to line 18, please replace the paragraph with the followings:

FIG. 3 and FIG. 4 are top and side views, respectively, showing another conventional test apparatus 170 which prevents obstruction by peripheral components such as add-in boards 181a and 181b mounted on the mother board 171. In order to obtain sufficient space, the test apparatus 170 employs an extension board 174 inserted into a first socket 173 and a second socket 176. The test apparatus 170 further comprises an interconnection board 175 to test the memory module 15. The interface board 175 is fixed to the mother board 171 by fasteners 185. The test apparatus 170 is an improvement over the test apparatus 150 of FIG. 1[, however,]. However, the structure increases the length of the contact points, and therefore, it is difficult to apply to high-speed products because it causes delay and/or distortion of the electrical signals. An additional problem with the test apparatus 170 is that it only provides week support for the test sockets 177.

At page 3, line 26 to page 4 line 3, please replace paragraph with the followings:

Most circuit boards have a front or component side, on which all or most of the components are mounted, and a rear or back side, which typically has few, if any, components. The test system 20 shown in Figs. 5-7 includes test terminals formed on the back side of the circuit board and arranged to couple the device to be tested to the circuit board. In the example of Fig. 5, the test terminals are connector pins 25 which are soldered to the back side of the circuit board. The test system 20 includes sockets 23 which are normally arranged to couple memory modules to the front surface of the circuit board 21 (in this example, a mother board). Referring to Fig. 7, however, one of the [modules]sockets 23a is removed and the connector pins 25 are formed on the rear surface of the mother board 21 on regions corresponding to the removed socket 23a shown by the dotted line. Alternatively, the connector pins 25 can be formed on the rear surface on regions corresponding to all sockets 23 without removing any of the sockets.

At page 4, line 29 to line 31, Please replace the paragraph with the followings:

The interface board 29 is supported between the interface board 29 and the mother board 21 by supports 33, and fixed to the mother board 21 by fasteners 35, thereby attaching the interface board 29 firmly to the mother board 21.

At page 5, line 13 to line 25, please replace the paragraph with the followings:

As described above, a test system for semiconductor devices according to the present invention tests devices by coupling them to the back side of a circuit board, thereby eliminating interference with CPUs (not shown) or other peripheral components such as the add-in boards 41a, 41b in FIG. 7 or 61a, 61b in FIG. 9. Therefore, the present invention does not require the use of conventional connection boards or extension boards. The present invention also [is also] facilitates the use of automatic handling of the semiconductor devices that are to be tested. Accordingly, the present invention reduces the cost of testing semiconductor devices under actual usage conditions. It also eliminates the delay and/or distortion of the electrical signals caused by unnecessary resistance, inductance, and/or parasitical capacitance. Moreover, because the present invention allows the devices to be tested to be coupled to the back side of the circuit board, this provides extra clearance that allows the devices and/or the interface board to be oriented in positions that might otherwise be impossible if they were mounted on the component side.

IN THE CLAIMS

1. (Once amended) A system for testing a semiconductor device comprising:

a circuit board comprising circuitry adapted to provide an actual operating environment for the semiconductor device, the circuit board having a front side and a back side; [and]

test terminals formed on the back side of the circuit board and arranged to couple the semiconductor device to the circuit board, and

automatic handling equipment arranged to allow automatic coupling and decoupling of the semiconductor device to the test terminals.

10. (Once amended) The system of claim 9, wherein the interface board is adapted to compensate for environmental differences caused the socket.

15. (Once amended) A system for testing a semiconductor device comprising:

a circuit board comprising circuitry adapted to provide an actual operating environment for the semiconductor device, the circuit board having a front side and a back side; [and]

means for coupling the semiconductor device to the back side of the circuit board, and

automatic handling equipment arranged to allow automatic coupling and decoupling of the semiconductor device to the test terminals.

22. (Once amended) A method for testing a semiconductor device comprising:

coupling the semiconductor device to the back side of a circuit board comprising circuitry adapted to provide an actual operating environment for the semiconductor device using the automatic handling equipment; [and]

operating the circuitry on the circuit board; and

decoupling the semiconductor from the back side of a circuit board using the automatic handling equipment.

Claims 26-29 are new